IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: :
Chen : Art Unit: 3672
Serial No. 09/833,016 : Examiner: Hoang Dang
Filed: 04/10/2001 : Atty's Docket:SC-98-25A
For: Force-Balanced Roller-Cone Bits, Systems, Drilling Methods, and Design Methods

PRELIMINARY AMENDMENT

Honorable Commissioner of Patents and Trademarks
Washington, DC 20231

Sir:

Prior to a first Office Action in this application, please enter the following amendments. As specified in the attached cover sheet, any extension of time necessary to prevent abandonment has been requested, and any fee necessary for consideration of this paper has been authorized to be charged to Deposit Account Number 07-2320.

IN THE CLAIMS

Please amend the claims to read as follows:

11. (AMENDED) A method of designing a roller cone drill bit, the steps of comprising:
(a) calculating the force balance conditions of a bit;
(b) defining design variables;
(c) determine lower and upper bounds for the design variables;
(d) defining objective functions mathmatically as a function of said design variables;
(e) defining constraint functions mathmatically as a function of said design variables;
(f) performing an optimization means; and,
(g) evaluating an optimized cutting structure by modeling.

Please add new Claims 14-16.

--14. The method of Claim 11, wherein said design variables include ones from the group of journal angle, cone-profile angle, offset angle, tooth crest length, radial position of the center of the crest length, and the tooth angles.

--15. The method of Claim 11, wherein said objective functions are defined by

$$Obj = (V_1 - V_m)^2 + (V_2 - V_m)^2 + (V_3 - V_m)^2$$

where $V_m = (V_1 + V_2 + V_3)/3$, V_1, V_2 and V_3 are the volume removed by cones 1,2 and 3, respectively.

--16. The method of Claim 11, wherein a lower bound of a tooth crest length is determined by the tooth strength. --

MARK-UP COPY OF AMENDED CLAIMS

11. **(AMENDED)** A method of designing a roller cone drill bit, the steps of comprising:

(a) calculating the force balance conditions of a bit;

(b) defining design variables;

(c) determine lower and upper bounds for the design variables;

(d) defining objective functions mathmatically as a function of said design variables;

(e) defining constraint functions mathmatically as a function of said design variables;

(f) performing an optimization means; and,

(g) evaluating an optimized cutting structure by modeling.

Please cancel Claims 1-10 and 12-13.

REMARKS

The claims have now been cancelled which were allowed in the parent application and additional dependent claims have been added.

A first Office Action is respectfully awaited. The Examiner is cordially invited to telephone the undersigned attorney or agent if it appears that an interview might be useful for any reason.

Respectfully submitted,

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June 27, 2001